Scientists and engineers at the Materials and Fuels Complex (lower right) and other INL facilities are finding ways to maintain and expand the safe use of nuclear energy.

The national nuclear laboratory

INL leads efforts to make better use of nuclear energy

Commercial nuclear power plants currently provide nearly 75 percent of the country's emission-free power, according to the Nuclear Energy Institute. Of the energy sources with the lowest life-cycle carbon dioxide emissions, only nuclear can currently provide the baseload power that utilities require.

As the nation considers its future use of nuclear energy, many are turning to Idaho National Laboratory. Much of what the world knows today about safe nuclear energy generation was discerned at INL, which began as the National Reactor Testing Station.

Today, INL continues its 60-year tradition as the nation's center of nuclear science and technology expertise. It is the nation's lead laboratory for nuclear energy research, reporting to the Department of Energy's Office of Nuclear Energy. And INL provides technical integration for most of the office's large national programs.

INL leads research, development and demonstration projects to help the nation maintain and expand its use of nuclear energy. INL experts are developing and testing new materials and fuels, efficiency and waste management systems, reactor plant designs and upgrades, and hybrid energy systems.

Energy security

The U.S. gets nearly one-fifth of its electricity from 104 commercial nuclear reactors in 31 states. They have been operating safely for decades. INL coordinates the Light Water Reactor Sustainability Program, which is finding ways to continue safely running these reactors for another 20 to 40 years in order to maximize the benefit of carbon-free electricity.

Efficiency and fuel management

Nuclear fuel removed from commercial power reactors

Continued next page

The Energy of Innovation

INL
Idaho National Laboratory

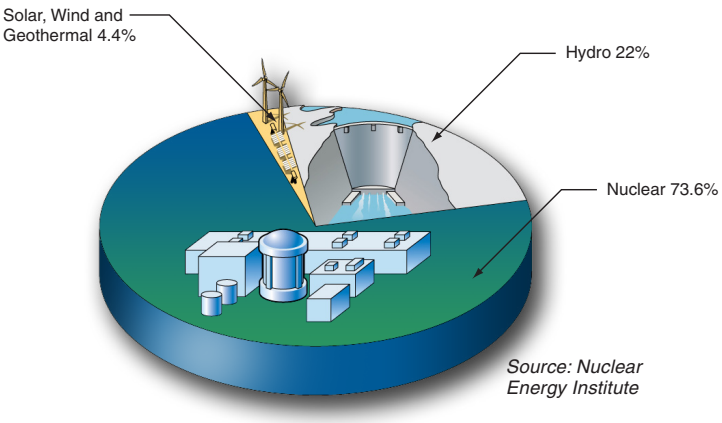
Continued from previous page

– commonly called "spent fuel" or "used fuel" – is currently stored at the commercial reactor site until a long-term management strategy can be finalized. INL is providing technical leadership and coordination for the Fuel Cycle Technologies program, which is pursuing technologies to get more energy from nuclear fuel through recycling while also reducing the toxicity and long-term decay heat of the waste requiring long-term storage.

Industrial applications

American industries such as plastic manufacturers and oil refineries require large amounts of electricity, heat and fossil fuels for making hydrogen — all critical components of their operations. Such industries are looking for ways to cut their energy bills and lower their carbon emissions. INL is leading a partnership with such industries to pilot a Next Generation Nuclear Plant, which would use an advanced nuclear reactor to generate electricity, process heat and hydrogen for industrial applications.

Sources of Emission-Free Electricity 2007



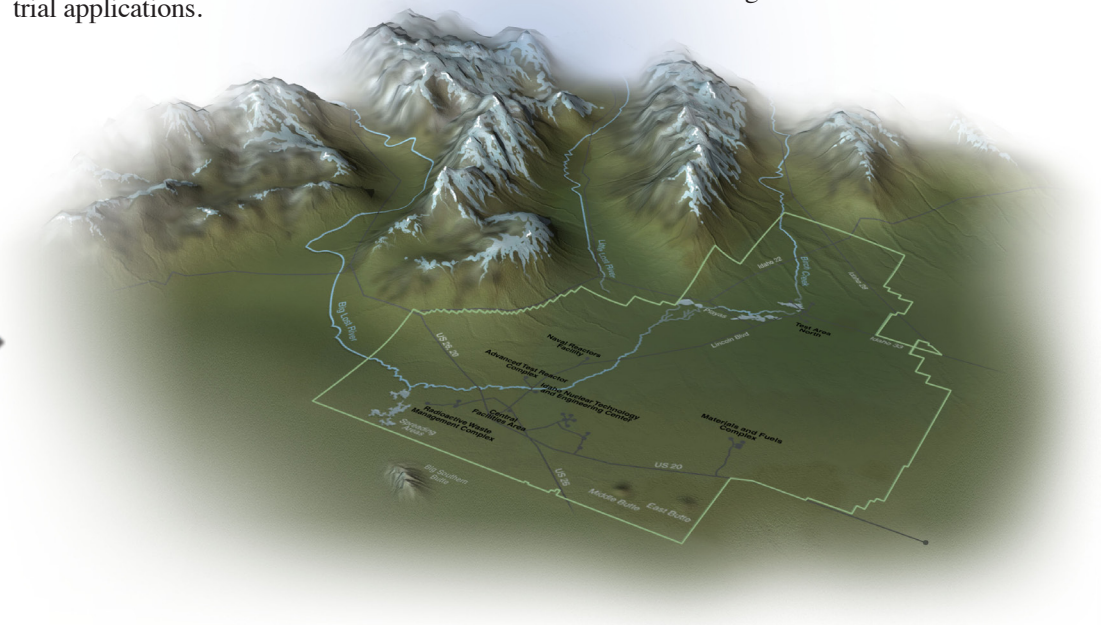
Source: Nuclear Energy Institute

Nuclear research

INL is home to the one-of-a-kind Advanced Test Reactor. It allows simultaneous irradiation of substances under varied conditions to test how new materials stand up to intense radiation or to produce medical and industrial isotopes. The Advanced Test Reactor National Scientific User Facility gives university and industry researchers a chance to conduct materials experiments in one of the world's most versatile and powerful research reactors.

Beyond electricity

INL is leading the development and understanding of hybrid energy systems that would combine renewable energy, fossil energy and nuclear energy in highly efficient, low carbon dioxide systems that provide electricity, transportation fuels and chemical products at one plant. This novel approach to "smarter" energy systems unlocks the door to true energy security, significant and near-term reduction of greenhouse gas, and security of energy supplies for generations to come.



INL's desert site – 32 miles west of Idaho Falls, Idaho – is remote and secure yet still convenient to airport, interstate and rail. It provides a unique and ideal setting for the nation's nuclear energy research.

For more information

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